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THE RELATIONSHIPS AMONG ACQUIRING AND ACQUIRED FIRMS' PRODUCT LINES

by

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ABSTRACT

This study develops detailed information on the relationships among the activities of acquiring and acquired firms at and near the time of merger for a sample of 94 takeovers undertaken between 1977-1982. We focus on takeovers for two reasons. First, takeovers are an important and controversial phenomenon. Second, takeovers allow us to look at marginal changes, admittedly large ones, in the firm's boundaries. Thus, they provide a useful way of examining relationships among activities of the firm without having to go into great detail regarding the historical decisions that generated the firm's current structure.

While the individual establishment is our basic data unit, in this study we aggregate the activities of the firm to the line of business (LOB) level. Each LOB of an acquired firm is classified as to its relationship horizontal, vertical (upstream or downstream), and conglomerate to the LOBs of the acquiring firm. Using these categorizations we aggregate the LOB-level information to the firm level to investigate the degree to which our sample of mergers is specialized to particular types of relationships. While we find a significant group of unspecialized takeovers, most appear to fit a specific category. We also look at the pattern of closed operations immediately following the takeover. Closings are generally concentrated in operations involving horizontal relationships. Finally, we consider the pattern of relationships between hostile and friendly takeovers and whether takeover premiums vary by type of merger. Merger premiums are not related to the type of relationship between the acquiring and acquired firm, but they are tied to whether the takeover is friendly or hostile.

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I. INTRODUCTION

The evidence that mergers generate gains to the shareholders of acquired firms is widely accepted, although the sources of these gains remain an open question. More generally, the activities included within the operations of a firm and its boundaries, are not well understood. Neoclassical theory views the firm as a production function, a relationship between inputs and outputs; in most industries, certainly those in manufacturing, the activities required for the production of particular goods are wholly contained within the firm. Yet, this is not the whole story. Firms in the real world diversify across activities that cannot be easily classified in terms of a production function, even when the possibility of scope economies is taken into account. This suggests the production function approach may be too narrow.

The transactions cost approach, first proposed by Coase (1937), emphasizes the use of non-market mechanisms to allocate and organize the activities of the firm. Activities falling within a technical production relationship are likely to be organized within the firm because the coordination costs are relatively low. But, transactions cost minimization, generally speaking, applies to activities beyond this limited set. Examples of such activities include upstream and downstream stages of production

which, in the Coasian framework, are included in the firm if the costs of using the market to obtain inputs or services are greater than their internal provision.

Diversified activities are difficult to incorporate in the Coasian framework because it is not clear what the transactions are. Unlike vertical integration, which is characterized by direct contractual relationships involving the procurement of inputs or sales of outputs, diversified activities suggest no obvious transaction cost generating relationships. This is not to deny that scope economies in capital, R&D, marketing, or other activities of the firm are not present. The key point is that on an empirical level it is difficult to uncover just what relationships characterize a firm's activities. Distinguishing true diversification from vertical and other related activities or deciding just how a firm's activities relate to each other are not simple tasks.

This study develops detailed information on the relationships among the activities of acquiring and acquired firms at and near the time of merger for a sample of 94 takeovers undertaken between 1977-1982. We focus on takeovers for two reasons. First, takeovers are an important and controversial phenomenon. Second, takeovers allow us to look at marginal changes, admittedly large ones, in the firm's boundaries.[1] Thus, they

provide a useful way of examining relationships among activities of the firm without having to go into great detail regarding the historical decisions that generated the firm's current structure.[2]

The analysis relies on data from the Census Bureau's Longitudinal Research Database (LRD), a comprehensive micro database on the activities of manufacturing establishments in the United States. The LRD provides information on establishment's product structures and identifies purchases of material inputs. It also enables us to identify the manufacturing establishments owned by each merging party at the time of merger.

While the individual establishment is our basic data unit, in this study we aggregate the activities of the firm to the line of business (LOB) level. Establishments under common ownership in the same 4-digit industry are treated as a single LOB for purposes of analysis. Each LOB of an acquired firm is classified as to its relationship to the LOBs of the acquiring firm. The detailed data in the LRD enable us to classify LOBs involved in a merger into horizontal, vertical (upstream or downstream), and conglomerate categories. Of course, individual LOBs can be classified in more than one category. For example, an acquisition of a material supplier by an already vertically

integrated firm exhibits both vertical and horizontal relationships.

Using these categorizations we aggregate the LOB-level information to the firm level to investigate the degree to which our sample of mergers is specialized to particular types of relationships. While we find a significant group of unspecialized takeovers, most appear to fit a specific category. We also look at the pattern of closed operations immediately following the takeover. Closings are generally concentrated in operations involving horizontal relationships. Finally, we consider the pattern of relationships between hostile and friendly takeovers and whether takeover premiums vary by type of merger. Merger premiums are not related to the type of relationship between the acquiring and acquired firm, but they are tied to whether the takeover is friendly or hostile.

The paper is organized along the following lines. In the next section we briefly lay out the research design as well as broadly set out the relationship between this study and the existing literature on merger gains. In the third section we describe the LRD. Since the LRD is a relatively new database, we provide a little more detailed description than is usual in a study such as this. Next we detail our methods for classifying activities of the merging parties. In particular, the way we measure vertical

integration is discussed in some detail. We then describe the sample of acquisitions that is examined. The results of our investigation are considered next. A brief conclusion completes the paper.

II. THE GAINS TO MERGER

The controversy surrounding the economic effects of mergers can be broadly characterized as an argument about whether or not mergers generate social value. On the one hand, some economists argue that mergers are efficiency enhancing. While a precise mechanism by which these efficiencies are created is not always spelled out, efficiencies are often attributed to the replacement of inefficient management. Unfortunately, this explanation begs the question of just how the new management improves efficiency.

On the other hand, despite the value enhancing aspects of mergers to acquired stockholders, there are many who do not subscribe to the view that mergers generate efficiencies. These practitioners argue that the observed takeover premiums reflect redistributions of rents or valuation errors so that observed increases in stock market values greatly overstate the gain to takeovers.[3]

It is possible that some wealth gains as measured by stock price increases are associated with underpricing of the target firm.

It is also possible that some of the gains come from the stockholders of the acquiring firm as managers overpay for acquisitions because they pursue objectives different from shareholders. Shleifer and Vishny (1988) argue that the emphasis on takeovers as a source of managerial control tends to obscure the fact that the bulk of merger activity consists of friendly acquisitions in which management is not drastically altered. These acquisitions provide managers with substantial opportunities to exercise empire building motives. In such circumstances the bidders will tend to overpay so that the target shareholders will receive the bulk of the gains to the transaction. Theoretically, both the undervaluation and the overpayment hypotheses are consistent with observed takeover premiums, as is the efficiency hypothesis. This suggests that investigation of the operating performance of the merging firms is necessary if we are to understand the size and sources of takeover gains.

There have been attempts to document the sources of merger gains with accounting and other operating data not tied directly to stock market values. Ravenscraft and Scherer (1987) examine the gains to merger using Federal Trade Commission (FTC) line of business data to identify the pre- and post-merger performance of lines of business acquired during the 1960s and early 1970s. They find that the operating performance of acquired entities is

slightly inferior both before and after merger, suggesting no operating efficiencies are generated by mergers. Concomitantly, these results also support the undervaluation or overpayment hypotheses.

In contrast to Ravenscraft and Scherer, studies based on more recent data from the LRD suggest that mergers have positive effects on efficiencies. Lichtenberg and Siegel (1987) find that productivity gains are associated with plant ownership change using a matched panel of continuously operating plants between 1972-1981. Consistent with the managerial efficiency view, Lichtenberg and Siegel (1989) also observe cuts in central office employment following merger. Similarly, McGuckin and Andrews (1988) observe market share gains to acquired LOBs operating in both 1972 and 1982 when they are acquired as part of a complete takeover of the firm. In contrast, partial acquisitions do not generate increases in market share. These studies suggest that the differences in the period covered could be the source of different findings reported by Ravenscraft and Scherer.

In a recent study, Bhagat, Shleifer, and Vishny (1989) develop information on 62 hostile takeovers consummated between 1984-1986 and conclude that the primary motive for these mergers is a desire to expand into related businesses. Supporting this line of argument are observed large scale selloffs of conglomerate

operations following the mergers. Morck, Shleifer, and Vishny (1987) find that the financial characteristics of hostile takeovers are more frequently observed in situations where the target firm is poorly performing and has a structure suggesting separation of ownership and management than friendly acquisitions. Taken together, these studies suggest that management improvement is likely to be observed in hostile takeovers and that the source of gains is found in the expertise of managers in those activities of the acquired firm that are related to the activities of the acquired firm. In more recent work, Morck, Shleifer, and Vishny (1990), suggest that shareholders lose when acquisitions satisfy managerial objectives that are identified with, among other things, diversification. Thus, the distinction between related and diversified activities is an important empirical issue.

The LRD is very useful in distinguishing related activities from diversified ones.[4] We now turn to a brief discussion of the LRD in order to provide some concreteness to the descriptions of how we measure the relationships among acquired LOBs.

III. THE LRD

The LRD is constructed by linking together individual establishment records from the Census of Manufactures (CM), which

takes place every 5 years, and the Annual Survey of Manufactures (ASM). At present, the LRD has substantially more than 2 million manufacturing establishment-year records including information on over 800,000 different establishments in the 1963-1986 period.

Each census year, 1963, 1967, 1972, 1977, and 1982 contains well over 300,000 establishments of which about two thirds are actually surveyed. The administrative record cases, which are not directly surveyed, represent small establishments (primarily establishments with less than five employees) that have little effect on aggregate industry totals. In non-census years, the LRD contains roughly 70,000 establishments in the period 1973-1978 and 55,000 after 1979 when there was a major redesign of the ASM.

In this study, we use 1977 and 1982 data in developing the measures for each establishment transferred by merger. This is because the years 1978-1981 are non-census years and thus the data are only collected for a subsample of the establishments represented in the LRD. Nonetheless, the ASM survey includes many of our sample firms and thus is invaluable in identifying the date of mergers and whether an establishment was closed before or after the merger.

The LRD contains a variety of information on individual establishments. Most of the data are reported on a yearly basis. By and large, the data contained in the LRD relate to the production of the establishment. The output data include value of shipments reported for each 7-digit product in census years and at the 5-digit level of detail in ASM years. Related information, such as value added, miscellaneous receipts, inventories, value of resales, and receipts for contract work are also available for each establishment. On the input side, the LRD contains data on major factors of production; labor (production and other), capital, materials, and purchased services.[5] In the area of classification and identification, the LRD includes information on the plant's ownership, location, age (for some plants), product and industry structure, and various status codes which identify, among other things, birth, death, and ownership changes. These identifying codes are used in developing both the longitudinal plant linkages and ownership linkages among plants. A more complete description of the LRD is given in McGuckin and Pascoe (1988) and the appendix.

IV. DETERMINING THE RELATIONSHIP BETWEEN ACQUIRED FIRMS AND ACQUIRING FIRMS

For this study, each establishment is allocated to its primary 4-digit SIC or LOB. Establishment data are then aggregated to the line of business level for each firm. Since most

establishments are relatively specialized in their primary 4-digit industry, the 4-digit groupings ensure that the inputs of the firm are generally associated with the mix of products produced by the establishment. Given this data structure it is straight-forward to identify horizontal relationships among merging firms. If the merging firms operate in the same 4-digit SIC at the time of merger, then we conclude that the LOB is a horizontal integration. Measuring vertical integration is far more difficult.

Vertical Integration

Vertical integration can be either an "upstream" or "downstream" integration. An "upstream" vertical integration occurs when the acquiring firm buys a LOB that produces materials or other inputs used by the acquiring firm in its production. An acquisition is said to be a downstream vertical integration if a firm buys a LOB that further finishes the acquiring firm's products.

The literature on the empirical measurement of vertical integration is limited because of difficulties in developing suitable measures of the concept. The essence of vertical integration is the substitution of internal (or nonmarket)

exchange for market exchange.[6] Resource allocation is decided by fiat or rules of thumb within the firm rather than through open market purchases; the price mechanism is suppressed in favor of internal exchange. Thus, the observational content of the concept involves relationships within the firm.

As a practical matter we identify an upstream vertical integration between the acquired and acquiring firm's LOBs when the acquired LOB provides an input that is used by one (or more) of the acquiring firm's LOBs. Downstream integration is determined analogously. Unfortunately, for our sample of mergers we cannot confirm that the established link represents true vertical integration for the firm since it cannot be ascertained if the vertical link is consummated in the sense that the merged firm actually used the output of the purchased LOB in its downstream operation.[7]

As a practical matter, we used the input structure of a typical LOB producing in each 4-digit industry to determine vertical linkages. All establishments with primary product specialization ratios greater than or equal to .95 in 1982 producing in each 4-digit industry were extracted from the LRD. Of the 170,000 establishments so identified, 70,000 reported detailed input data. The remaining 100,000 are administrative records. The purchased material inputs of each of these "pure" producers were

aggregated across establishments and expressed as a percentage of total material costs. This procedure provides a ranking of material supplying LOBs by their relative importance as suppliers for every manufacturing LOB.[8] In principle, it is possible to compare the inputs and outputs of an acquired LOB directly with those of each LOB of the acquiring company to determine the extent of vertical linkages. By concentrating on primary inputs (those used by pure producers) to the 4-digit industry, we minimize the chances for overstating vertical relationships by excluding inputs associated with the secondary activities of the establishment.

Even at the 4-digit level of detail, many observed inputs represent relatively small proportions of an LOB's total input requirements. For all 449 4-digit manufacturing SICs, the pure producers reported an average of roughly 22 4-digit inputs per establishment. The standard deviation is 13 inputs. For the 256 LOBs that are active for our sample of acquired firms, the average number of inputs is 27, while the comparable number for the 332 LOBs operated by acquiring firms is 25. Again, to minimize the impact of minor categories of material inputs, we develop our measures of vertical integration by restricting the inputs to LOBs accounting for 1 percent or more of total input purchasers. This cutoff provided about ten inputs for each LOB. We also used a 5 percent cutoff to provide a rough test of the

sensitivity of our results to the arbitrary 1 percent cutoff because this cutoff has been used by others.

V. THE SAMPLE OF MERGERS

The sample of takeovers includes 94 transactions undertaken between 1977 and 1982. This time period was chosen because it coincides with 2 census years so that we have a complete enumeration of each firm's manufacturing activities before and after the merger.

The LRD database is composed of observations on establishments. Associated with each establishment is a firm identifier that can be used to link establishments under common ownership. Ownership changes are identified in the database through changes in these firm identifiers in conjunction with various status codes identifying reasons for observed changes. Unfortunately, it is currently difficult to link the 'firms' identified in the LRD to other company level databases such as Compustat, The Quarterly Financial Report, or SEC data.[9]

The 94 transactions employed here represent those complete takeovers for which data in the LRD with respect to timing and other aspects of the transaction could be readily verified. Each merger involved a takeover of a public company so that a premium

could be calculated from stock price data. In all cases the premiums (unadjusted) were positive, ranging from less than 5 percent to over 200 percent and averaging 71 percent.[10]

The sample includes 79 unique acquiring firms. In 67 cases, the acquiring firm purchased only one target. In 12 cases, acquirers purchased more than one seller. There are nine cases in which the same firm purchased two firms and three in which three separate firms are acquired by one acquirer. Of the 94 transactions, 20 or about 21 percent, involved a contested or hostile takeover. The remaining transactions are treated as friendly.

The 94 mergers involved the transfer of 1,196 establishments, 115 of which were closed by the acquiring firm directly following the takeover.[11] Thus, by 1982, about 2 years after the average merger took place (see Table 1), there are 1,081 acquired establishments in the sample.[12] As shown in Table 1, aggregation of these establishments provides 533 transferred LOBs. Table 2 shows that, as expected, the acquiring firms are larger than acquired firms, both in terms of value of shipments and number of operating plants. These takeovers also generally involved fairly diversified firms: The average primary 4-digit LOB specialization ratio is .51 and .56, respectively, for the acquiring and acquired firms.

VI. FINDINGS

Acquired LOBs

We begin our discussion with Table 3 that provides a breakdown of the 533 LOBs transferred and still operating in 1982. The first thing to notice is the absence of any pure vertical mergers involving the purchase of downstream LOBs. This is not surprising since nonmanufacturing activities are not available in our data set. We do know that some of the acquiring firms in our sample had extensive operations in retail and wholesale trade.[13] Thus, some of the pure horizontal and conglomerate relationships observed may actually have vertical components. A more important consequence of the omission of non-manufacturing information is a strong possibility for understatement of the degree of "relatedness," as it reflects scope economies in marketing. In particular, product extension relationships in which the products use common distribution systems are likely to be missed by our procedures.

Table 3 offers categorizations of the acquired LOBs based on two different criteria for defining a vertical relationship; (1) if 5 percent or more of the materials purchases of the type produced by the acquired LOB are supplied by the acquired LOB, and (2) if 1 percent or more of materials purchases are from the

acquired LOB. The 1 percent cutoff includes most major inputs since the average 4-digit LOB had ten material inputs involving more than 1 percent of total input costs. The categorizations are sensitive to this cutoff. The proportion of total value of shipments in the pure vertical category rises from .23 to .31, an increase of 50 percent when the 1 percent instead of the 5 percent criterion is used. This increase derives mainly from a decrease in LOBs designated conglomerate. As shown in line 1 of the table, the conglomerate category drops by 11 percentage points, from .34 to .26, when the criterion is changed from 5 percent to 1 percent.

Pure horizontal relationships represent just over or just under 10 percent of purchased value of shipments depending on the cutoff used to determine a vertical relationship. Between .30 and .36 percent of the value of purchased shipments have both vertical and horizontal elements. In terms of shipments, even using the relatively conservative 5 percent criterion, over 50 percent of the LOBs involved a vertical relationship. If we include horizontal and vertical relationships in a "related" category, and recognize that the conglomerate category includes product extension mergers, then these data suggest that in terms of resources acquired, this sample of takeovers is characterized by the acquisition of related LOBs.

There are substantial differences between the distribution of acquired LOBs by size and numbers. Using the 1 percent criterion, the number of LOBs involving a conglomerate relationship is 43 percent of the transferred LOBs compared to only 26 percent when the transfers are measured in terms of shipments. This indicates that purchased LOBs classified as conglomerate (those not related), are smaller than LOBs involved in related activities. Pure horizontal relationships, probably reflecting antitrust policy, are also generally smaller, in terms of size, than their numbers suggest.[14] In fact, LOBs in the horizontal and conglomerate categories are two times smaller than those in the vertical categories under both the 1 percent and 5 percent criterion (see Table 3). The largest LOBs are in the two combined horizontal and vertical categories. For these two categories, the average size of the acquired LOB is over three times that observed for conglomerate acquisitions.

The numbers in Table 3 are all based on the 4-digit SIC level of detail. If one uses a 3-digit or 2-digit categorization, the relative importance of conglomerates declines dramatically. Even with the 5 percent cutoff, less than 7 percent of the shipments of acquired LOBs are conglomerate. There is also a dramatic decline (50 percent) in pure vertical mergers. As would be expected, the two categories involving combined vertical and

horizontal mergers increase. Thus, using broader categories increases substantially the number of LOBs and value of shipments in related mergers. But, pure horizontal and vertical integration becomes less important as the vertical/horizontal categories increase from 30 percent to 40 percent of the sales.

Comparisons To Previous Categorizations

Our categorizations show few similarities to those reported by Ravenscraft and Scherer (1987) using the FTC LOB data. Ravenscraft and Scherer find, using a 5 percent cutoff for inputs, that their sample of mergers included roughly 30 percent pure horizontal, 10 percent mixed vertical and horizontal, 12 percent pure vertical, and 60 percent conglomerate. These values compare to 13 percent pure horizontal, 29 percent mixed vertical and horizontal, 20 percent pure vertical, and 38 percent conglomerate based on our calculations. We combined true conglomerate and product extension mergers in the Ravenscraft and Scherer sample to make the categories more compatible with ours. Ravenscraft and Scherer find higher proportions of horizontal and conglomerate relationships than we do. There is more similarity when the takeovers themselves are classified by type. However, we still find more vertical and fewer horizontal mergers than Ravenscraft and Scherer.

There are a number of differences in procedures that could explain the difference of the findings. Ravenscraft and Scherer use data for the 1973-1977 period, ours is for 1977-1982. The level of classification is somewhat broader for the FTC data than for the LRD. This is consistent with the greater proportion of horizontal mergers found by Ravenscraft and Scherer. But, it does not account for the smaller proportions of vertical relationships. Recall that we found roughly 49 percent of the value of shipments in the vertical grouping, compared to their 22 percent. However, since they use assets rather than shipments as the size measure, this could also account for some of the difference. Other differences between the studies are that our sample includes only complete takeovers, uses manufacturing data exclusively, and is generally not as broad in coverage as the one used by Ravenscraft and Scherer. On the other hand, we know of no particular selection biases in our sample procedure except a tendency toward large public takeovers.

Pattern of Acquired LOBs by Industry

There is no obvious pattern of the acquired LOBs by 4-digit industry category. Most of the industries show only one or two purchased LOBs. The largest number of transactions in any

4-digit industry is 14 and this is clearly an outlier. No other 4-digit industry had more than seven acquired LOBs and only seven had more than five. Table 3 distributes the numbers of acquired LOBs by 2-digit SIC level and type of relationship. This table shows again the dominance of conglomerate LOB acquisitions by number across most industries. But, in a few industries; Food (SIC 20), Paper Products (SIC 26), Chemicals (SIC 28), and Electrical (SIC 36); acquired LOBs in related categories dominate.

Closed LOBs

As noted earlier there are 115 establishments, roughly 10 percent of the total acquired LOBs in this sample of takeovers, that were closed by acquiring firms by 1982. This rate of closure is in line with that observed for all manufacturing.[15]

Table 5 provides information on the 115 closed establishments grouped into the 85 LOBs that experienced at least one closure. It shows that for both conglomerate and pure vertical relationships, the proportion of closed LOBs is less than the overall proportion of acquired establishments in this category as given in Table 3. In contrast, all horizontal categories showed greater closure rates than would be expected on the basis of the number of establishments acquired in each group.

Turning to the proportion of value of shipments in each category, we again see the value associated with conglomerate closings is generally lower than their numbers would suggest. The category that really stands out is the combined horizontal/vertical upstream category. This category accounts for 46 percent of the value of shipments of closed establishments, but only 18 percent of the number of establishments. Overall, 68 percent of the shipments in closed establishments are associated with horizontal acquisitions.

Acquired Firms

In terms of numbers, about one half the LOBs represent a conglomerate relationship. The pattern is the same when the takeovers are individually categorized according to the type of relationship that accounts for the largest percentage of the acquired firm's value of shipments. Table 6 shows that 50 percent of the takeovers are classified as conglomerate using the 5 percent criterion and roughly 40 percent using the 1 percent criterion for defining a vertical acquisition. These percentages are similar to those found in Table 3 where each LOB, regardless of ownership, is classified by type. This similarity is reflective of the fact that most takeovers are relatively specialized as to type.

Table 7 shows primary type of relationship specification ratios for each takeover in the same format as Table 4. These ratios give an indication of how concentrated the acquired LOBs of each acquiring firm is to a particular relationship category. The average type of relationship specialization ratio is about the same for the 5 percent vertical criterion (.74) and the 1 percent vertical criterion (.72). The variation is quite large within each type category, regardless of the vertical measurement criterion. About one third of the takeovers have primary type specialization ratios over 90 percent and 18 percent exhibit ratios below .50.

While a number of the takeovers include more than one relationship type, for many takeovers the primary character of the takeover is well-defined at the time of the takeover. Consistent with these findings, if instead of categorizing the takeovers according to which of the five types of relationships predominate, we use a simple two-way breakdown into unrelated (conglomerate) and related activities, then the proportion value of shipments in the related category averages 65 percent for the 94 transactions.

It is important to note that even those mergers, which are specialized to related activities of the acquired firm, do not necessarily imply a decline in the acquiring firms'

diversification index. If a vertical acquisition is in a secondary or nonprimary activity of the acquiring firm, then diversification as measured by either primary industry specialization or a Herfindahl index can decrease even though the takeover represents a merger of related activities. This possibility is observed for many of the mergers in our sample. Thus, one needs to be careful not to attribute mergers of related activities with a decrease in measured diversification.[16]

Relationship of Type of Merger to Merger Premium

In this section we use the information on type of merger developed above to investigate whether the premiums paid to targets vary systematically with the nature of the relationship of the acquiring and acquired firm. It is generally recognized that takeover premiums in contested or hostile takeovers are larger than in friendly takeovers. Earlier we noted that recent work (Bhagat et. al., 1990) suggests that hostile takeovers, associated by many with managerial changes, involve takeovers of related businesses. Both Bhagat et. al., and Bhide (1989) find that the tendency toward relatedness in hostile takeovers is reinforced by selloffs following the takeover. The main conclusion of this work appears to be that hostile takeovers represent a deconglomeration movement and a return to corporate specialization. This suggests that hostile takeovers should be

characterized by takeovers in which the acquiring firm operates in LOBs related to those of the acquired firm. Moreover, the more diversified is the acquired firm following the takeover, the greater the likelihood of significant selloffs. On this argument, hostile takeovers could be associated with diversified targets.

But, what about friendly takeovers? Ravenscraft and Scherer (1987), whose sample was mostly friendly takeovers, find that pre-1980s mergers were predominately conglomerate, unsuccessful, and led to large scale selloffs of acquired assets. Morck et. al., (1988) suggest a distinction between disciplinary takeovers, associated generally with contested takeovers and management replacement, and synergistic takeovers in which the integration of the businesses are necessary to realize merger gains. But, synergistic gains can come from any of the relationship categories between the merging parties. Thus, it is not clear to us that premiums should vary with merger type. Merger gains can come from a variety of sources and we are unaware of arguments that support relatively larger, and unanticipated gains to acquired firm shareholders associated with the particular source for the takeover gains. Therefore, we would not anticipate any relationship between the merger premium and the nature of the relationship between the merging parties.

While we cannot hope to completely sort out these issues here, we use regression analysis to examine the relationship between the observed merger premium, the relatedness of the merging parties, hostile versus friendly takeovers, the degree of diversification of the merging parties, and the relative size of the merging firms. The dependent variable is the merger premium, defined as the simple percentage increase in the price of the target firm's stock over a 30-day event window.

To capture the nature of the relationship between the merging parties we use two procedures. In the first procedure dummy variables are created for each of the conglomerate, horizontal, vertical, and mixed vertical-horizontal types of mergers. We also use a simple two-way classification of the mergers into "related" and conglomerate. The second procedure consists of creating a continuous variable for merger type by taking the percentage of the total sales of the acquired firm located in LOBs related to the activities of the acquiring firm.

Hostile takeovers are not always easy to identify. As a practical matter we use classifications supplied by Annette Poulsen that distinguish takeovers as contested or not. Our sample of 94 transactions broke down into 20 hostile and 74 friendly.

Two measures of the target firm's diversification are used. The first is the primary industry specialization index and the second is the Herfindahl index. Both indexes are based on the 4-digit level of industrial classification. Finally, following Jarrell and Poulsen (1989), we include the relative size of the target firm to the acquiring firm to capture a "wealth effect" on merger premiums.

The results of various regressions with merger premiums as the dependent variable confirm the significant positive association of premiums with hostile takeovers. Consistent with the results of Jarrell and Poulsen (1989), the larger is the acquired firm to the acquiring the greater is the premium; but, for this sample it generally is insignificant. We found no significant relationships between the premiums paid at the time of the merger and the type of merger involved or the degree of diversification of the target firm. Substantial experimentation shows that these results are robust to various specifications: Table 8 provides representative results.

There is some evidence that the type of merger is related to the hostile-friendly breakdown although it is weak at best. Since hostile takeovers are associated positively with premiums, this might be a way to explain a relationship between premiums and type of merger. This hypothesis suggests an instrumental

approach to estimating the premium equation. Here we settle for a more straight forward approach since we do not have any good instruments. We directly examine whether hostile and friendly takeovers differ with respect to "relatedness" and target firm's diversification levels. There are 11 conglomerate and nine related mergers among the 20 hostile takeovers in our sample. For both groups, the average premium is about 91 percent. For the 74 friendly mergers, the split was 40 conglomerate and 34 related. The average premiums are significantly smaller for this group than for the hostile takeovers. Among friendly takeovers, merger premiums are 64 and 68 percent, respectively, for the conglomerate and related categories. These results hardly suggest a relationship.

However, using the continuous measure of related and nonrelated activities, the proportion of acquired value of shipments in related activities to total value of shipments acquired, we observe that 74 percent of the acquired shipments in hostile takeovers are in related activities. In contrast, friendly mergers show 62 percent of total acquired shipments in related activities. For this sample, hostile takeovers are associated with less diversified targets than are friendly takeovers. The average primary product specialization ratio for acquired firms in hostile takeovers is .63 compared to only .52 for the same

ratio in friendly takeovers. These differences, however, are only significant at the 80 percent confidence level.

VII. CONCLUDING COMMENTS

These data indicate that the takeovers when measured by size of acquired LOBs, generally involve areas directly related to the activities of the acquiring firm. Despite the possibility of overstating vertical linkages because we do not observe the specific transactions between establishments, even the relatively conservative 5 percent cutoff shows that vertical relationships dominate. This appears to be a shift from earlier periods that showed larger proportions of resources associated with the conglomerate category. Moreover, since the sample of acquiring firms generally had extensive operations in wholesale and retail trade, we probably understate 'related' LOBs. These results appear consistent with several recent papers showing that takeovers generally involve expansions into related businesses.

However, the degree and type of relatedness vary greatly among our sample of takeovers. While there exists a nontrivial portion (16 percent) of the takeovers for which the acquired LOBs show no concentration (specialization by type of merger less than

50 percent) in a particular relationship category, most acquisitions are relatively concentrated to a specific category of relationship. Of this specialized group, roughly one half are best characterized as conglomerate acquisitions. These conglomerate acquisitions appear to be just as specialized in areas unrelated to the pretakeover activities of the acquiring firm as those acquisitions in related areas of production. These acquisitions are generally small consistent with our finding that in terms of size, related acquisitions dominate the sample of takeovers.

The data suggest that acquisitions have different purposes, and one must be careful about categorizing all acquisitions as being of particular types. Moreover, the analysis of merger premiums indicates that no particular type of acquisition is most profitable. We found no relationship between the premiums paid to target shareholders and the type of relationship characterizing the takeover. Thus, there does not appear to be any penalty (or gain) in terms of premiums to conglomerate takeovers. Moreover, the type of acquisition is not strongly related to whether the takeover is hostile or friendly. However, hostile takeovers in our sample show a slightly higher percentage of shipments associated with related LOBs than did friendly takeovers.

Viewing takeovers as marginal changes in the structure of the firm, these results suggest that expansions of the firm cannot be explained primarily as being associated with the neoclassical view of the firm as a production function. Scale economies may explain some of the horizontal acquisitions. But, the large volume of activity associated with vertical relationships suggests transaction cost considerations play a role in many takeovers. The conglomerate takeover could be a reflection of scope economies associated with the production function. But, Streitwieser (1990) could not find any industry based relationship among the non-primary activities associated with establishments primary to particular industries except for establishments commonly owned. This suggests that conglomerate takeovers are linked more to firm specific factors than to production economies associated with its mix of products produced in its establishments.

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Table 1: Distribution of Acquisitions by Year

	1977	1978	1979	1980	1981	1982	Total
No. of acquisitions	6	14	27	14	20	13	94
No. of acquired lines of business	24	74	163	62	144	76	533**
No. of plants acquired	36	184	428	109	300	139	1196
No. of plants closed by acquiring firms*	6	25	68	6	9	1	115

* These plants were closed by acquiring firms after merger. The 115 closed plants reported here do not include 57 plants for which we are not able to determine the exact date of closure.

**The total 533 excludes 10 LOBs that were completely closed before 1982. For this reason, there was no data for the entire LOB post merger.

Table 2: Characteristics of the Takeovers Sample

	Average Value			
	Value (000)	Primary LOB Shipment(1977) Ratio	Number Specialization Plants	Number of Firms
Acquired Firm	348,731	.56	12	94
Acquiring Firm	1,393,233	.51	42	79

Table 3

Relationships Among Acquiring and Acquired Lines Of Business (LOBs) [a]

Relationships Among Acquiring Vertical Mergers Defined as all LOB that Supplied or Consumed 1 to 5 Percent of Total Materials

Categories of Acquired LBOs	5 Percent			1 Percent		
	Number [e]	Proportion of Total Shipments [b]	Average Size	Number [e]	Proportion of Total Shipments [b]	Average Size
1) Conglomerate	280 (.54)	.34	15,907	224 (.43)	.26	13,917
2) Pure Horizontal	93 (.18)	.13	16,354	61 (.13)	.07	14,524
3) Pure Vertical(upstream)	83 (.15)	.23	30,113	139 (.25)	.31	27,865
4) Horizontal/Vertical (upstream)	42 (.08)	.18	48,595	68 (.13)	.13	36,294
5) Horizontal/Vertical (upstream/downstream)	34 (.06)	.12	44,671	41 (.07)	.23	41,212
Total [d,c]	532	1.00	22,620	533	1.00	22,578
Total Vertical 3,4,5	159 (.28)	.53	38,108	248	.67	32,383
Total Horizontal 2,4,5	169 (.32)	.43	30,064	170	.43	29,669
Total Horizontal/Vertical 4,5, combined	76 (.14)	.30	46,840	109	.36	38,144

a. LOBs derived from sample of 94 takeovers in 1977-82 period.

b. The proportion of the total shipments of LOBs purchased that are classified in each category.

c. Only one pure downstream relationship was observed so this category is omitted from the table.

d. Ten LOBs are not included in this analysis because they were completely closed almost before 1982.

e. Proportion of total number of LOBs observed in parentheses.

Table 4

Acquired LOBs, Distributed by 2-digit SIC

Number of Transactions

Industry	Total	Pure Vertical (upstream)	Pure Horizontal	Horizontal/Vertical[a]	Conglomerate
20	55	14	11	11	19
22	25	3	2	3	17
23	11	--	3	--	8
24	9	--	--	4	5
25	16	--	7	--	9
26	8	2	--	3	3
27	9	--	3	--	6
28	36	12	1	12	11
29	5	--	--	2	3
30	18	6	--	6	6
31	1	--	--	--	1
32	30	2	5	3	20
33	33	7	3	2	21
34	66	10	12	5	39
35	88	9	19	5	55
36	65	7	18	13	27
37	14	3	2	--	9
38	29	2	8	3	16
39	15	--	3	1	11
Total	533	77	97	72	286

a A 5-percent cutoff is used to define vertical relationships.

Table 5

Distribution of LOBs with Closed Establishments by Type [a]

Category of Merger	Number of LOBs	Percent of LOBs	Percent of Total Number Plants	Percentage of Total Shipments of Closed Establishments	Percent of Total Shipments Acquired[b]
			Acquired[b]		
1) Conglomerate	39	31	46	37	54
2) Pure Horizontal	18	13	21	15	18
3) Pure Vertical	6	14	7	16	15
4) Horizontal/ Vertical (upstream)	15	20	18	24	8
5) Horizontal/ Vertical (upstream and downstream)	7	7	8	8	6
Total	85	85	100	100	100

Category of Merger	Percentage of Total Shipments Acquired[b]
1) Conglomerate	42
2) Pure Horizontal	13
3) Pure Vertical	25
4) Horizontal/ Vertical (upstream)	1
5) Horizontal/ Vertical (upstream and downstream)	7
Total	100

Category of Merger	Percent of Total Shipments Acquired[b]
1) Conglomerate	19
2) Pure Horizontal	10
3) Pure Vertical	13
4) Horizontal/ Vertical (upstream)	50
5) Horizontal/ Vertical (upstream and downstream)	8
Total	100

a. There are 115 closed plants associated with 85 LOBs.

b. Source Table 3. This is the distribution of acquired establishments.

Table 6

Distribution of 94 Takeovers by Type [a]

Categories of Acquired LOBs	5 Percent Vertical Criterion		1 Percent Vertical Criterion	
	Number	Percent	Number	Percent
1) Conglomerate	50	54	39	44
2) Pure Horizontal	13	14	8	9
3) Pure Vertical(upstream)	19	19	29	29
4) Horizontal/ Vertical Upstream	5	5	10	12
5) Horizontal/ Vertical (upstream and downstream)	7	7	8	6
Total	94	99[b]	94	100

a) Takeovers are classified according to a category that accounts for the largest proportion of the acquired firm's shipments.

b) Total does not add to 100 due to rounding.

Table 7

Specialization of 94 Takeovers by Type [a]

Categories of Acquired LOBs	5 Percent Vertical Criterion		1 Percent Vertical Criterion	
	Number	Average Specialization Ratio[b]	Number	Average Specialization Ratio[b]
1) Conglomerate	50	.77 (.21)	39	.76 (.21)
2) Pure Horizontal	13	.68 (.20)	8	.63 (.20)
3) Pure Vertical(upstream)	19	.70 (.22)	29	.70 (.21)
4) Horizontal/ Vertical Upstream	5	.62 (.31)	10	.62 (.25)
5) Horizontal/ Vertical (upstream and downstream)	7	.71 (.26)	8	.81 (.16)
Total	94	.74	94	.72

a The specialization ratio is the proportion of total acquired shipments that are associated with the primary relationship type of the takeover.

b Standard deviation in parentheses.

Table 8

Regression Analysis of Merger Premiums
Dependent Variable: Merger Premiums
(t-Statistics in Parentheses)

Indepenbdent Variables [1]

	CONSTANT	RSIZE	HOSTILE	REL	REL1	H-INDEX	SP-RATIO	-2 R
1.	61.0180**	.1288	27.5157**	5.2817*				.0783
	(10.68)	(1.52)*	(3.08)	*(0.71)*				
2.	58.5294**	.1387	26.7007**		7.6438			.0784
	(7.05)	(1.57)*	(2.97)	*	(0.72)			
3.	56.5210**	.1040	27.5390**	3.5715*		10.7324		.0734
	(6.71)	(1.13)*	(3.07)	*(0.46)*		(0.72)		
4.	53.6185**	.1122**	26.8967**		6.3772	11.5618		.0749
	(5.21)	(1.19)*	(2.99)	*	(0.59)	(0.81)		
5.	50.6403**	.1108	26.7199**		5.7782	15.0029		.0772
	(4.28)	(1.19)*	(2.98)	*	(0.54)	(0.94)		

*Denotes "significant" at the 99% confidence level.

1. Definition of independent variables:

RSIZE : Size of the target firm relative to the acquirer.

HOSTILE: Dummy variable (1, if hostile, 0 otherwise).

REL : Dummy variable (1, if a related takeover, 0 if conglomerate).

REL1 : Continuous variable: percentage of total sales of the target firm located in LOBs related to the activities of the acquiring firm.

H-INDEX: Herfindall index of diversification of acquired firm.

SP-RATIO: Product specialization ratio of acquired firm.

Appendix 1

Table 1

Variables in the LRD

Symbol	Variable	Availability*
ppn	permanent plant number	
id	identification number	
ind	tabulated industry code	
ppc	primary product class	
pisr	primary industry specialization ratio	
ppsr	primary product specialization ratio	
il3	status of establishment	
ei	employer identification number	
dind	derived industry code	
et	establishment type (0=ASM)	C
ar	administrative record (1=AR)	C
cc	coverage code	
sc	source code	
lfo	legal form of organization	C
st	state code	
smsa	smsa code	
cou	county code	
plac	place code	
va	value added	
vr	value of resales	
rcw	receipts for contract work	
msc	miscellaneous receipts	
te	total employment	
pw1	production workers: March	
pw2	production workers: May	
pw3	production workers: August	
pw4	production workers: November	
pw	production workers (average)	
ph1	personhours: January-March	
ph2	personhours: April-June	
ph3	personhours: July-September	
ph4	personhours: October-December	
ph	total personhours	
sw	total salaries and wages	
ww	wages: production workers	
ow	wages: other employees	
lc	total supplemental labor costs	
le	legally required supplemental labor costs	
vlc	voluntary supplemental labor costs	
cp	cost of materials, parts, etc.	
cr	cost of resales	
cf	cost of fuels	
ee	cost of purchased electricity	
pe	quantity purchased electricity	
cw	cost of contract work	
cpc	cost of purchased communications	A 77 & 82

fib	b.o.y. inventory: finished goods		
wib	work-in-progress		mib
	materials		
fie	e.o.y. inventory: finished goods		
wie	work-in-progress		
mie	materials		
tib	b.o.y. inventory: total		
tie	e.o.y. inventory: total		
nb	new building expenditures		
nm	new machinery expenditures		
ue	used capital expenditures		
bab	building assets - b.o.y.	A; after 73	
mab	machinery assets - b.o.y.	A; after 73	
bae	building assets - e.o.y.	A	
mae	machinery assets - e.o.y.	A	
br	building rents	A	
mr	machinery rents		A
bd	building depreciation		A; after 76
md	machinery depreciation		A; after 76
brt	building retirements		A; after 76
mrt	machinery retirements		A; after 76
rbs	building repair		A; after 76
rm	machinery repair		A; after 76
m	material goods		C
mqpc	quantity produced and consumed		C
mqdc	quantity received and consumed		C
mc	delivered cost		C
pi	product code		C
pqp	product quantity produced		C
pqs	product quantity shipped		C
pv	product value shipped		C
pgit	quantity of interplant transfers		C
pvit	value of interplant transfers		C
pqpc	quantity produced and consumed		C
tvs	total value of shipments		C

*The variable is available for all years and all establishments except as noted: A = collected for ASM establishments only;
C = collected in census years only
b.o.y. = beginning of year
e.o.y. = end of year

Appendix 1

Table 2
Number of Establishments in the LRD for Each Year

YEAR	NUMBER OF ESTABLISHMENTS	NUMBER OF ADMINISTRATIVE RECORD CASES
1963	305,747	*
1967	305,611	118,622
1972	312,398	122,158
1973	73,460	-
1974	68,262	-
1975	71,145	-
1976	70,346	-
1977	350,648	144,648
1978	73,853	-
1979	57,559	-
1980	55,953	-
1981	55,045	-
1982	348,384	128,307
1983	51,619	-
1984	56,551	-
1985	55,128	-
1986	54,858	-

*There were no administrative record cases in 1963.
-There are no administrative record cases in the ASM.

ENDNOTES

1. While the analysis in this paper focuses on mergers, the categorization of a firm's activities and changes in them can be examined without reference to mergers. This is the task undertaken by Streitwieser (1990) who examines the scope of products produced by establishments as a way of measuring the limits of production technology as a method of defining the firm.

2. Of course, the firm's history is likely to be an important determinant of its propensity to merge, and thus, the likelihood of the firm being in our sample.

3. Shleifer and Summers (1987) have also argued that the takeover process generates substantial disruption costs that can overwhelm any efficiencies generated by the merger.

4. Not only is it possible to sort out relationships among the activities of the firm in great detail, it is also possible to sort out the gains (or losses) to merger through examinations of the performance of particular operating units before and after the takeover. Such analysis can, of course, be supplemented with more traditional accounting and stock market data. The advantage of using the LRD as the basis for a direct study is that it permits attribution of changes in operational performance to the acquired firm assets. This mitigates the need to rely on less systematic data, such as the discussions in annual reports, newspapers, 10 reports, etc. that Bhagat, Shleifer, and Vishny (1990) are forced to use.

5. It would be possible to undertake the analysis at a 7- or 5-digit level on the output side of the establishments operation. On the input side, materials data are collected at a level of detail in between the 5- and 7- digit SIC level, however, labor and capital are only available at the 4-digit SIC level.

6. Although we have no means of dealing with this issue here, we note that vertical integration is not a simple binary categorization of activities between integrated and marketed. In fact, there exist many forms of contract, 'controls', which describe the relationships among intermediate, upstream and downstream producers.

7. We attempted to test the sensitivity of our assumption by examining whether LOBs identified as vertically related experienced increases in interplant shipments following the merger. Unfortunately, it appears that the data for this item is not consistently reported to the Census Bureau before and after the

merger. For those LOBs that are reporters of interfirm transfers, in an overwhelming majority of the cases, increased transfers are associated with identified vertical relationships.

8. Although the mapping between input and output codes is not perfect, with adjustments in a few industries, the correspondence is quite close at the 4-digit level of detail. Thus, we were able to use a 4-digit level of detail for both inputs and outputs.

9. The LRD data are confidential and have not yet been linked to public data sources. Although the Center for Economic Studies plans to link to Compustat and other similar financial databases, matching is now done on an individual project basis. Since name files in the early years are not complete, the matching process is time consuming. The 94 matches represent about 30-40 percent of the complete takeovers identified in the LRD, which includes both public and private producers, during the 1977-82 period.

10. Premiums reported here are the simple percentage increase in the price of the target firms stock over the 30 day interval prior to announcement unadjusted for market effects.

11. We are not sure about the ownership of 57 establishments that were closed before 1982. We assume that the 57 establishments for which the exact date of closure is uncertain were closed prior to merger in the numbers reported in the text.

12. The 79 acquiring firms also added, through merge, 580 establishments other than those purchased in complete takeovers from the 94 acquired firms in our sample. (521 establishments were operating in 1977 and 59 establishments were opened after 1977 and then purchased.) Also, in the same period, the acquiring firms opened 577 new establishments and got rid of 1,126 establishments by sales or closure in addition to the 115 closed directly after the merger. Eleven establishments owned by firms in our buying group were also sold to other firms within the group.

13. Data on nonmanufacturing operations prior to 1982 are not available. For 1982, the average acquiring firm had 78.74 percent of its shipments in manufacturing.

14. This is consistent with the results obtained in McGuckin (1990).

15. This is true even when the index of diversification is adjusted for vertical integration before and after the merger. The adjustment is taken by redefining the firm activities to include only final outputs and including vertical related sales in the output of the final product industry.

16. The LRD shows that roughly 10 percent of the establishments with 250-500 employees closed during the same time interval. The rate is lower for larger establishments (25%) and greater for smaller establishments (20%).